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CLAIMS

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We claim:

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- 5 1. A method of detecting the presence of *Treponema pallidum* or antitreponemal antibodies in a biological sample, comprising:
 - contacting an acidic repeat protein or one or more isolated, immunogenic *Treponema pallidum* peptide of the acidic repeat protein with an antibody-containing biological sample; and
 - detecting formation of a complex between the immunogenic protein or peptide and the antibody, wherein the presence of the complex indicates the presence of *Treponema pallidum*.
- The method of claim 1, wherein the isolated immunogenic
 Treponema pallidum peptide is a peptide within a repeat region of the acid repeat protein.
- The method of claim 1, wherein the immunogenic peptide comprises an amino acid sequence selected from the group consisting of SEQ ID NOs: 2, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 22, 24, 26, and conservative variations thereof.
 - 4. The method of claim 1, wherein the immunogenic peptide is encoded by a nucleotide sequence as shown in SEQ ID NOs: 1, 3, 5, 19, 21, 23, and 25.
 - 5. The method of claim 1, wherein the immunogenic peptide comprises an amino acid sequence having the sequence shown in SEQ ID NO: 15.
- 6. The method of claim 1, wherein the *Treponema pallidum* is *T*.

 30 pallidum subspecies pallidum, *T. pallidum* subspecies pertenue (CDC-2 strain), *T. pallidum* subspecies pertenue (CDC-1 strain), or *T. pallidum* subspecies endemicum.

7. The method of claim 1, wherein detecting the presence of the complex indicates the presence of a disease selected from the group consisting of syphilis, yaws, and bejel.

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- 5 8. The method of claim 1, wherein the immunogenic peptide comprises the amino acid sequence shown in SEQ ID NO: 2.
 - 9. The method of claim 1, wherein the immunogenic peptide comprises the amino acid sequence shown in SEQ ID NO: 4, and wherein the presence of the complex indicates the presence of yaws.
 - 10. The method of claim 1, wherein the immunogenic peptide comprises the amino acid sequence shown in SEQ ID NO: 6, and wherein the presence of the complex indicates the presence of bejel.

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- 11. The method of claim 1, wherein the peptide is bound to a solid phase.
- 12. The method of claim 1, wherein the peptide is labeled.
- 20 13. The method of claim 12, wherein the label is selected from the group consisting of an electrochemiluminescent label, a chemiluminescent label, an enzymatic label, a bioluminescent label, and a fluorescent label.
- 14. The method of claim 1, further comprising incubating the peptideantibody complex with a second antibody specific for the peptide, wherein the second antibody is labeled with a detectable label and binds to the peptide-antibody complex.
- The method of claim 1, wherein the biological sample compriseswounds, blood, tissues, saliva, semen, vaginal secretions, tears, urine, bone, muscle, cartilage, CSF, skin, or any human tissue or bodily fluid.

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16. A method of detecting the presence of Treponema pallidum in a biological sample, comprising:

contacting an antibody to an immunogenic T. pallidum peptide of an acidic repeat protein with a biological sample; and

- 5 detecting formation of a complex between an acidic repeat protein or peptide, if such is in the biological sample, and the antibody, wherein the presence of the complex indicates the presence of *Treponema pallidum*.
- 17. An isolated, immunogenic *Treponema pallidum* peptide comprising 10 an amino acid sequence as shown in SEQ ID NOs: 2, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 22, 24, 26 or conservative variations thereof.
- 18. The immunogenic peptide of claim 17 wherein the Treponema pallidum is T. pallidum subspecies pallidum, T. pallidum subspecies pertenue 15 (CDC-1 strain), T. pallidum subspecies pertenue (CDC-2 strain), or T. pallidum subspecies endemicum.
 - 19. An antibody specific for a T. pallidum acidic repeat protein or immunogenic peptide of the acidic repeat protein.
 - 20. The antibody of claim 19 wherein the immunogenic peptide comprises an amino acid sequence as shown in SEQ ID NOs: 2, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 22, 24, 26 or conservative variations thereof.
- 25 21. The antibody of claim 19 wherein the immunogenic peptide is encoded by a nucleotide sequence as shown in SEQ ID NOs: 1, 3, 5, 19, 21, 23, or 25.
- 22. The antibody of claim 19 wherein the antibody is a monoclonal 30 antibody.

- 23. An immunogenic composition comprising a pharmaceutically acceptable carrier and an isolated, immunogenic *T. pallidum* peptide in an amount sufficient to induce a protective immune response to *T. pallidum* in a mammal, the immunogenic peptide comprising an amino acid sequence as shown in SEQ ID NOs: 2, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 22, 24, 26 or conservative variations thereof.
- 24. The composition of claim 23, wherein the Treponema pallidum is T.
 pallidum subspecies pallidum, T. pallidum subspecies pertenue (CDC-1 strain), T.
 10 pallidum subspecies pertenue (CDC-2 strain), or T. pallidum subspecies endemicum.
 - 25. The composition of claim 23, wherein the composition is administered to a subject having syphilis, yaws, or bejel.
- 15 26. The composition of claim 23, wherein the immunogenic peptide is conjugated to a carrier protein.
 - 27. The method of claim 1, wherein the immunogenic peptide comprises an amino acid sequence having the sequence shown in SEQ ID NO: 20.

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28. A kit for detecting *T. pallidum* in a biological sample using the method of claim 1, comprising an acidic repeat protein or one or more isolated, immunogenic *Treponema pallidum* peptide of the acidic repeat protein, and instructions for carrying out the method of claim 1.

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29. A kit for detecting *T. pallidum* in a biological sample using the method of claim 16, comprising an antibody to an immunogenic *T. pallidum* peptide of an acidic repeat protein, and instructions for carrying out the method of claim 16.